

BSc (Hons) Agriculture (specialisation: Sustainable Forestry)

1. Objectives

Mauritius has less than 2% of its endemic forests left, and it is of vital importance to conserve these remaining pristine areas for our future generations. Forests have a vital role to play in climate change, preservation of biodiversity, carbon sequestration, in the environment in general, and also as a source of economically important products. Furthermore, Mauritius is at the cross roads as far as its land use is concerned. Large acreage of land, previously under sugarcane, will be converted to other uses. The right path will lead to environmental conservation and sustainable development. Forestry and agro forestry are among the land uses that offer considerable potential. Government is laying stress on sustainable alternatives to land use such as agro forestry and forestry, particularly since ecotourism, economic forestry and land use are expected to assume greater importance in the coming years.

This programme aims to equip students with a broad spectrum of scientific, technical, managerial and business skills, and knowledge needed to contribute to the development and enhancement of the forestry sector in Mauritius.

On completion of this programme, learners will be able to:

- acquire knowledge and appreciation of the characteristics and dynamics of agricultural and forest ecosystems;
- acquire knowledge of the realised and potential economical importance of forests;
- obtain knowledge and skills of various agricultural and forest technologies;
- acquire knowledge and skills in the management, protection and conservation of forest and agro forestry ecosystems;
- develop the ability to transfer relevant knowledge and skills of appropriate agricultural and forest management practices to relevant stakeholders.

2. General Entry Requirements

In accordance with General Entry Requirements for Admission to the University for Undergraduate Degrees.

3. Programme Requirements

SC: Credit in Mathematics and Chemistry.

2 GCE 'A' Level passes in related approved Science subjects (Mathematics, Botany, Zoology, Chemistry, Physics, Biology, Food Studies, Computer Science or Computing).

Preference will be given to candidates holding an 'A' Level in Biology, Chemistry or Physics.

4. Programme Duration

	Normal (Years)	Maximum (Years)
Degree	3	5

5. **Credits per Year:** Minimum 18 credits, Maximum 48 credits subject to Regulation 4.

6. **Minimum Credits Required for the Award of Undergraduate Degree: 111**

Breakdown as follows:

	Credits from			
	Core Modules	Taught	GEM	Project
Degree	96		6	9

Practical Training and the Scientific Communication module must be completed satisfactorily for the award of the degree.

Students may exit with

- (a) a Certificate after having earned 30 credits in core modules.
- (b) a Diploma after having earned 60 credits in core modules.

7. Assessment

Each module will be assessed over 100 marks (i.e. expressed as %) with details as follows (unless otherwise specified):

Assessment will be based on a Written Examination of 2-3 hour duration, carrying a weighting of 70%, and Continuous Assessment carrying 30% of total marks for AGRI modules. Modules from other Faculties/Departments/Centres will carry weighting in the Written Examination and the Continuous Assessment as specified by the concerned Faculties/Departments/Centres. Continuous Assessment will be based on laboratory/field works, and/or assignments, **and should include at least 1 class test.**

A minimum of at least 30% should be attained in each of Continuous Assessment and Written Examination, with an overall total of 40% for a candidate to pass a module.

Modules will carry the weightings of 1, 3 or 5 depending on their status (Introductory, Intermediate or Advanced). Weighting for a particular module is indicated within parentheses in the module code.

Modules will carry credits in the range of 3 to 6. Project will carry 9 credits.

Assessment of practical training will be based on supervisor's report and student's report. For satisfactory completion of the practical training, a minimum of 40% should be attained. The 'Practical Training' will be offered either at the end of year 1/or at the end of year 2, depending on placement opportunities.

Assessment of the scientific communication module will be based on continuous assessment of students throughout the module and/or submission of a portfolio. For satisfactory completion of the module, a minimum of 40% should be attained.

Written examinations for all the modules will be carried out at the end of the year.

8. Important Note

The rules as stipulated in this Programme Structure and Outline Syllabus will replace all other rules and regulations.

9. List of Modules

<u>Code</u>	<u>Module Name</u>	<u>Hr / Yr</u> <u>L+P</u>	<u>Credits</u>
COMS 1010(1)	Communication Skills	DE	3
CSE 1010e(1)	Introduction to Information Technology	OE	3
AGRI 1018Y(1)	Agricultural Chemistry and Soil Science	45+ 60	5
AGRI 1019Y(1)	Crop Science	45+ 60	5
AGRI 1020Y(1)	Biology and Control of Plant Pests, Diseases, and Weeds	45+ 60	5
AGRI 1035Y(1)	Agronomy and Horticultural Production I	45+60	5
AGRI 1022Y(1)	Animal Science	45+ 60	5
AGRI 1023Y(1)	Animal Production	45+ 60	5
AGRI 2001Y(3)	Food Science and Technology	60+ 60	6
AGRI 2024Y (3)	Agricultural Engineering and Applications	45+ 45	4
AGRI 2045Y(3)	Statistical Methods for Agricultural Sciences	45+ 45	4
AGRI 2025Y(3)	Introductory Applied Systems, Economics, Management and Extension	60+ 60	6
AGRI 2026Y(3)	Biotechnology	60+ 60	6
AGRI 2071Y(5)	Silviculture and Forest Management	60+ 60	6
AGRI 2048Y(5)	Forest Ecology and Forest Biodiversity	60+ 60	6
AGRI 3000Y(5)	Project	-	9
AGRI 3057Y(5)	Forest Protection	60+ 45	5
AGRI 3058Y(5)	Economic Importance of Forestry	60+ 60	6
AGRI 3059Y (5)	Application of GIS and Remote Sensing in Forestry	60+ 45	5
AGRI 3060Y(5)	Forest and Sustainable Land Management	60+ 60	6
AGRI 3100	Scientific Communication	20+0	-
GEM (1)		-	6

AGRI2000 - Practical Training can be done in either Year 1 or Year 2

AGRI3100 – Scientific Communication will be done in Semester 1 in Year 3

Total no. of credits : 111

10. Programme Plan - BSc (Hons) Agriculture (specialisation : Sustainable Forestry)

Year 1			
<u>Code</u>	<u>Module Name</u>	<u>Hr / Yr</u> <u>L+P</u>	<u>Credits</u>
COMS 1010(1)	Communication Skills	DE	3
CSE 1010e(1)	Introduction to Information Technology	OE	3
AGRI 1018Y(1)	Agricultural Chemistry and Soil Science	45+ 60	5
AGRI 1019Y(1)	Crop Science	45+ 60	5
AGRI 1020Y(1)	Biology and Control of Plant Pests, Diseases, and Weeds	45+ 60	5
AGRI 1035Y(1)	Agronomy and Horticultural Production I	45+60	5
AGRI 1022Y(1)	Animal Science	45+ 60	5
AGRI 1023Y(1)	Animal Production	45+ 60	5
Year 2			
AGRI 2001Y(3)	Food Science and Technology	60+ 60	6
AGRI 2024Y (3)	Agricultural Engineering and Applications	45+ 45	4
AGRI 2045Y(3)	Statistical Methods for Agricultural Sciences	45+ 45	
AGRI 2025Y(3)	Introductory Applied Systems, Economics, Management and Extension	60+ 60	6
AGRI 2026Y(3)	Biotechnology	60+ 60	6
AGRI 2071Y(5)	Silviculture and Forest Management	60+ 60	6
AGRI 2048Y(5)	Forest Ecology and Forest Biodiversity	60+ 60	6
Year 3			
AGRI 3000Y(5)	Project	-	9
AGRI 3056Y(5)	Forestry and Ecotourism	30+ 45	3
AGRI 3057Y(5)	Forest Protection	60+ 45	5
AGRI 3058Y(5)	Economic Importance of Forestry	60+ 60	6
AGRI 3059Y (5)	Application of GIS and Remote Sensing in Forestry	60+ 45	5
AGRI 3060Y(5)	Forest and Sustainable Land Management	60+ 60	6
AGRI 3100	Scientific Communication	20+0	-
GEM		-	6

AGRI2000 - Practical Training can be done in either Year 1 or Year 2

AGRI3100 – Scientific Communication will be done in Semester 1 in Year 3

Total no. of credits : 111

11. Outline Syllabus

COMS 1010(1) - COMMUNICATION SKILLS

Writing skills, non-verbal communication, modes of speech delivery and presentation aids, speeches, perception and listening skills, business and technical writing.

CSE 1010e(1) - INTRODUCTION TO INFORMATION TECHNOLOGY

The World of Computers; Main components of the computer; The evolution of computers; Input and output devices; Secondary storage; Programming, Systems Software; Application software; Systems analysis and design; Communications and connectivity; The internet; Information technology and society.

AGRI 1018Y(1) – AGRICULTURAL CHEMISTRY AND SOIL SCIENCE

Agrochemicals, their properties, metabolism, and mode of action. Chemistry of fertilisers: straight, complex, compound mixed, blended fertilisers. Fertiliser solutions. Foliar fertilisers. Manures, municipal sewage, compost. New sources of soil amendments : seaweed, raw and transformed wastes from various sources, minerals, etc.

Chemistry of pesticides: Organochlorines, organophosphates, carbamates, pyrethroids, dinitrophenols, phthalimides, substituted ureas, triazines, inorganics, botanical pesticides, bio-pesticides. Analysis of pesticides, fertilisers, growth promoters, etc.

Soil as a natural body. Weathering. Factors and processes in soil formation. Physical, physico-chemical, biological and mineralogical properties of soil. Soil profile. Soil air, water, temperature, soil organic matter and soil organisms. Concepts of soil fertility and land suitability. Soil taxonomy. Soil biology. Soil amendments. Soil pollution. Heavy metals. Polyaromatic hydrocarbons (PAH), persistent organic pollutants (POP) in soils. Soil bioremediation.

AGRI 1019Y(1) - CROP SCIENCE

Classification, identification, morphology, ecology and uses of economically important crops.

Mendelian Inheritance. Qualitative genetics. Monohybrid, dihybrid, trihybrid ratios. Gene interaction. Linkage and chromosome mapping. Sex linked and extra-nuclear inheritance. Sex reversal. Quantitative genetics. Heritability. Inbreeding. Linebreeding. Heterosis. Population genetics. Hardy-Weinberg Law.

Objectives of plant breeding. Selection techniques. Methods of crop improvement. Genetic variation and manipulation of variability. Breeding of selected crops. Legislative framework.

Environmental influences on crop growth and development. Vegetative and reproductive plant physiology. Plant water relations. Plant growth substances. Plant growth analysis. Yield determination and crop productivity.

AGRI 1020Y(1) - BIOLOGY AND CONTROL OF PLANT PESTS, DISEASES AND WEEDS

Taxonomy, systematic, biology, ecology and economic importance of pests, plant pathogens and weeds affecting crops. Control and management of pests, diseases and weeds of crop plants. Concept and principles of IPM. Biological, physical, chemical, cultural, biology-based, genetic, biotechnological and legal methods of pest control. Botanical pesticides and biopesticides. Pest-resistant transgenic crops (GMOs). Economics of crop protection.

Quarantine for plant health and biological control agents; pest-free areas; Sanitary & phytosanitary issues; the SPS Agreement of the WTO; Pest risk assessment, surveillance and mitigation; Phytosanitary inspection, quarantine treatments and disposal of plants/produce; Standards, certification and legislation. Climate change and crop protection. GIS and Remote Sensing for crop protection.

AGRI 1035Y(1) - AGRONOMY AND HORTICULTURAL CROP PRODUCTION I

Principles of field crop agronomy. Crop-environment interactions. Cropping systems. Crop propagation.

Plant Nutrition. Nutrient deficiency symptoms and their corrections. Nutrient requirements and fertiliser recommendations for specific crops / cropping systems.

Applied crop physiology. Husbandry and production of economically important horticultural crops. Field operations and techniques in crop production.

AGRI 1022Y(1) - ANIMAL SCIENCE

Anatomy of non ruminant and ruminant animals digestive systems. Principles of nutritional physiology and biochemistry. Meeting nutritional objectives of farm animals. Feeds and feed evaluation. Production of compound feeds: quality assurance framework.

Avian Reproductive Systems and The mammary gland structure. Endocrine effects on animal products: Milk production, egg production.

Muscle structure and biology. Growth and body composition. Farm Animal Reproductive systems (Male and Female). Reproductive physiology (Oestrous cycles, puberty, pregnancy and parturition). Genetic and physiological adaptation to the environment, especially in hot climate.

Principles of Meat science: chemical composition. Post Mortem Muscle Chemistry. Effects of pre and post slaughter treatments on carcass /meat quality and hygiene. Carcass appraisal.

An introduction to the basic principles of quantitative and qualitative genetics. Breeding systems of various farm animals.

Disease causing agents. Major Pests and diseases of farm animals. The impact of diseases at the animal, enterprises and national and global levels. Spread and transmission of diseases. The immune system: structure and function. Natural and acquired immunity. Food Borne Diseases. Zoonotic diseases.

AGRI 1023Y(1) - ANIMAL PRODUCTION

Role and importance of animal production systems in agricultural enterprises: poultry, pigs, beef and dairy cattle, deer, sheep, goats rabbits, production potential of novel species. Constraints to animal productivity and production. Public concerns over animal production practices.

Fundamental stockmanship for managing farm animals: rationing; weighing and tagging; usage of preventive and diagnostic equipment; handling and restraining animals, animal's environment; evaluation of body condition score; performance records. Diagnosing farm animal abnormal behaviour. Animal housing evaluation. Pasture management.

AGRI 2001Y(3) - FOOD SCIENCE AND TECHNOLOGY

Classification, chemical structure and properties of food constituents and food additives. Chemical composition, properties and nutritional value of food commodities. Primary sensory attributes of foods and perception of food quality. Microbial food spoilage. Useful micro-organisms. Incidence and causes of food borne disease. Characteristics of major food-borne disease micro-organisms. Physical, chemical, sensory and microbiological analysis of foods. Types of nutrients and their role in the human body. Planning a balanced diet.

Food laws and standards. Concepts of food quality and safety. Factors which affect quality and safety. Food hazards. Food preservation by heating, chilling, freezing, dehydration, chemicals and ionizing radiation. Packaging materials. Processing of selected food products. Process control, application of principles of food hygiene and relevant codes of practice/guidelines to ensure quality and safety. Traceability. Importance of food safety management throughout the food chain. Comprehensive food safety management systems.

AGRI 2024Y(3) – AGRICULTURAL ENGINEERING AND APPLICATIONS

Basic engineering science relevant to agriculture, soil systems and water.

Soil tillage. Agricultural machinery: tractors, rotovators, mechanical planters and harvesters, and fertigators. Tractor Technology. Field mechanization. Pesticide sprayers and fertiliser applicators. Farm roads. Water logging and drainage. Precision agriculture, remote sensing, and GIS.

Irrigation systems: Equipment and operation. Soil moisture and soil moisture characteristic curves. Soil water movement. Infiltration rate. Hydraulic conductivity of soil. Nuclear methods of soil moisture determination. Irrigation systems: surface, overhead irrigation and drip Irrigation. Planning and design of various irrigation systems based on soil-water plant climate relationships. Use and maintenance of irrigation systems.

Farm structures and farm buildings. Waste management technology. Agro-meteorology. Introduction to controlled environment technology.

AGRI 2025Y(3) - INTRODUCTORY APPLIED SYSTEMS, ECONOMICS, MANAGEMENT AND EXTENSION

Introduction to agricultural systems concepts: holistic approach to agriculture; an overview of farming systems in the World with particular reference to the SADC region.

Applied Economics in Agriculture: Introducing microeconomics and macroeconomics theories.

Agriculture and Economic Development: Evolution of the Mauritian agricultural sector from beginnings to present days; challenges facing the Mauritian agricultural sector.

Agricultural management: The framework of farm management; introductory farm budgeting.

Agricultural Marketing: from commodity marketing to value-addition in agricultural products; marketing functions; marketing channels and costs.

Agricultural Extension: introductory concepts and principles; Participatory approach in agricultural research, production & extension.

AGRI 2026Y (3) – BIOTECHNOLOGY

Structure and functions of cells and organelles; Bio molecules: Polysaccharides, sugars; storage polysaccharides; Lipids, classification and properties, biological membranes; Proteins, amino acids, covalent and three-D structure of proteins; Enzymes, properties and mechanism of actions, enzyme kinetics. Glycolysis.

Organisation of genetic material, gene structure, expression and transmission. Control of gene expression. Structure and properties of DNA. DNA replication. Protein synthesis. Principles of gene cloning. Recombinant DNA technology.

Concept and basis of biotechnology. Tissue culture techniques and applications. Application of biotechnology in agriculture and crop improvement.

AGRI 2045Y(3) - STATISTICAL METHODS FOR AGRICULTURAL SCIENCES

Introducing statistics in agriculture. Descriptive statistics – displaying and summarising data. Probability distributions. Point and interval estimation. Hypothesis testing. Analysis of categorical data. Correlation and regression analysis. Design

and analysis of experiments: Principles of agricultural experimentation. Analysis of variance. Completely randomized design, Randomized block design, Latin square design. Factorial treatment structure. Non-parametric methods. Data entry and analysis using EXCEL and MINITAB.

Introduction to research methodology. Qualitative and quantitative research. Sampling methods. Questionnaire development, design and administration. Data coding and processing using SPSS. Elements of scientific and technical writing.

AGRI2071Y (5) - SILVICULTURE AND FOREST MANAGEMENT

Tree biology, physiology and biochemistry. Types of trees and tree species in forests. Tree identification. Selection. Soil types. Water requirements. Nutrient management. Energy balance. Seed conservation techniques. Propagation techniques. Nursery Stock Management. Silviculture. Silvicultural systems. Culture methods. Coppicing. Biomass measurements. Plant management (thinning, pruning, tree shaping). Tree assessment and risk management.

Monitoring of forest physical, chemical, biological parameters. Community forestry.

Tree species in forests in Mauritius, offshore islets and outer islands.

Objectives of forest management. Concept of increment (mean annual increment and current annual increment). Types of rotation in forestry. Yield regulations. Forest growth and mensurations. Forest policy and legislation. International forest policy dialogues.

AGRI 2048Y(5) - FOREST ECOLOGY AND FOREST BIODIVERSITY

Types of forests. Characteristics and dynamics of various forest ecosystems. Physical, chemical and biological factors affecting forests and forest productivity. Energy dynamics in forest ecosystem. Impacts of natural and anthropogenic activities. Flora and fauna in forests. Legislation and International conventions regarding biodiversity in Mauritius. Endangered and protected species of forest flora and fauna in Mauritius (including Rodrigues and other outer islands). Invasive alien and endemic species in forests. Biodiversity conservation.

AGRI 3000Y(5) - PROJECT

Every student will be allocated a research topic related to agriculture. The research work will be carried out under academic supervision. Students should demonstrate good practice in using skills and knowledge acquired during the programme and follow dissertation guidelines as laid down by the Faculty of Agriculture.

AGRI 3057Y(5) – FOREST PROTECTION

Abiotic and biotic factors affecting forest ecosystems. Soil type, water, climate (cyclones, storms, high winds, flooding, fire). Tree health care. Important pests,

diseases and weeds affecting forest ecosystems. Human activities damaging forests. Principles and methods of forest protection for biological and economic sustainability. Fire fighting. Remedial measures. Best management practices for forest protection. Methods for assessing status of forest health and productivity.

AGRI 3058Y(5) - ECONOMIC IMPORTANCE OF FOREST

Important benefits from forests. Economically important products : wood, timber, biomass, wild fruits and spices, honey, silk, pesticidal extracts, medicinal preparations, resin, latex, oils, etc. Ecotourism. Social aspects of forestry. Religious aspects of forestry. Recreation. Aesthetics.

Wood, timber : Types and quality of wood and timber for various purposes. Pulp for paper making, wood for matchsticks, etc. Productivity. Harvesting. Collarding.

Apiculture : Honeybee biology, bee castes, hive design, bee management and feeding, protection from pests, diseases, cyclones and unfavourable climatic conditions, honey extraction and maturation, honey quality.

Sericulture : Silkworm biology, characteristics of mulberry, silkworm management and feeding, protection from pest, diseases, cyclones and unfavourable climatic conditions, silk extraction, cleaning and reeling, silk properties and quality.

Pesticidal extracts : secondary metabolites, biologically active chemical groups, mode of action, extraction, preparation, formulation, use.

Medicinal preparations: types of extracts, medicinal properties, mode of action, preparation, use.

Ecotourism : Role of forests in the tourist industry. Benefits of forests on human health, leisure and recreation. Design and site considerations for ecotourist forestry sites. Operation and management of ecotourist forestry sites.

AGRI 3059Y(5) - APPLICATION OF GIS AND REMOTE SENSING IN FORESTRY

Principle and components of Global Information Systems (GIS) and Remote Sensing. Uses of GIS and remote sensing in forestry. Forest inventory. Forest measurements. Monitoring and surveying; Forest maps. Stand analysis and data interpretation.

AGRI 3060Y(5) – FOREST AND SUSTAINABLE LAND MANAGEMENT

Properties of soil, water and air in forests. Soil/land degradation. Soil/land and water management and conservation in forest ecosystems. Interaction between forests and its environment (soil, water and air). Carbon sequestration in forests. Rainfall patterns and influence on climate. Role of forests in local and global climate change. Carbon credits and international conventions.

Agro forestry. Types of agro forestry. Combinations of trees and crops of specific purposes. Benefits of agro forestry. Effect of agro forestry on soil properties, climate and environment. Economic importance of agro forestry.

Concept of watershed. Importance of watersheds for the environment, water availability, replenishment. Different watershed areas in Mauritius. Interactions of watershed and forest ecosystems. Watershed management. Drainage. Mangrove forests.

Environment Impact Assessment (EIA). Origins of EIA. EIA process. EIA tools. EIA toolkit. Screening and scoping criteria. Environmental issues. EIA write-up, appraisal, feasibility study, viability and socio-economic aspects. Strategic Environmental Assessment (SEA) for major programmes. Preliminary Environmental review (PER).

AGRI 3100 - SCIENTIFIC COMMUNICATION

Avenues of communication in science. Scientific and technical writing. Oral and poster presentations. Ethics of scientific publishing.

The dissertation guidelines. Planning and managing the dissertation writing up process – effective literature search and review, introduction, methodology, results, discussion, conclusions, referencing rules and plagiarism.

AGRI 2000 – PRACTICAL TRAINING

Student is required to undergo a practical training of 6-8 weeks duration during winter vacation either in Year 1 or Year 2. The aim is to expose the student to the real work environment, acquaint him/her of what employers would expect of a graduate. Student is required to submit a report on her/his training placement.

This module does not carry any credit, but training must be completed satisfactorily for the award of the degree.